

Technical change and the environment (ENM015) 2018

Technical change and the environment is a 7,5 credit course given in study period 2 by the division of Environmental Systems Analysis at Chalmers University of Technology.

Course webpage: <https://chalmers.instructure.com/courses/269>

Examiner: Professor Björn Sandén, bjorn.sanden@chalmers.se

Teaching staff:

Björn Sandén, bjorn.sanden@chalmers.se, 031-772 86 12

Hampus André, hampus.andre@chalmers.se, (course secretary)

Johnn Andersson, johnn.andersson@chalmers.se

Anna Nyström Claesson, anna.nystrom.claesson@chalmers.se

Aim

The course aims at putting technology into context. It aims at making the student aware of the interdependence between technical change, societal development, and the natural environment, in order to be able to take part in knowledgeable discussions on how technical change may help or hinder our ability to deal with environmental problems, resource limitations and societal development in the coming decades. The course provides knowledge of historical developments and current trends and introduces the student to different theoretical frameworks that can be used to analyse change.

Learning outcome

After completion of this course, the student should be able to:

- ... describe the role of technology in society and society's relation to nature in a historical context
- ... describe the implications of technical change for sustainable development
- ... describe and explain drivers and barriers in industry and society for introducing new technology and the role of politics in this process
- ... describe some basic theories and models of technical change and demonstrate an accurate use of concepts from the literature
- ... critically examine environmental policy and technology assessments
- ... combine knowledge of historical patterns, theoretical models and physical constraints with technological imagination to formulate plausible scenarios of change towards sustainability or its opposite.

Content

The first part of the course puts the current industrial society into a historical context. A 10 000 year history (or more) of the relationships between Technology, Society and Nature is briefly explored and the evolution of the industrial society is studied in more detail. In the second part, different

theoretical frameworks that can be used to understand the process of technical change are discussed, including economics of innovation and historical and social studies of technology. The third part deals with how an understanding of technical change can be used when thinking about the future, assessing novel technologies or addressing grand challenges, such as climate change, with corporate strategy or governmental policy.

Organisation

The course is organised as a series of lectures and seminars. The lectures present selected parts of the literature and complement the literature with additional material. Lectures are given on Mondays (9-11:45) and Wednesdays (10:00-11:45, 13:15-17:00). At the seminars, some topics are discussed in greater detail. Some of the seminars are compulsory. Written assignments are given during the course. Lectures and assignments are published at the course website in Canvas.

Literature:

- Grübler, Arnulf, *Technology and global change*, Cambridge University Press
- Ponting, Clive, *A new green history of the world*, Penguin Books
- Collection of articles (available as pdf:s at course website)

Examination

Up to 60 points can be achieved in the course: up to 45 from the take-home exam, up to 10 in total from three online tests (quizzes), and up to 5 from the optional assignment E. See the schedule for the dates and times.

Points required for a given grade are as follows:

5: 50-60 4: 40-49 3: 30-39 NC: <30

In addition to the graded activities, there are three mandatory assignments and seminars (Assignment/Seminar A, B and C). All of these must be attended/completed before the course can be passed. If attendance is impossible, there are makeup assignments for these tasks. Seminar D is voluntary.

Although assignment E is optional, students who have the ambition of achieving grade 5 in the course should plan to do it because it is quite rare for a student to score 50 from the tests and exam alone.

Opportunities to write the take-home exam again are offered in the Easter and August reexamination periods. In case you are planning to take the reexam, contact the examiner two weeks in advance. The online tests and Assignment E are only offered when the regular course runs in study period two.

Schedule for Technical change and the environment (ENM015) 2018

W	Date	Time	Lectures and Discussions	Action	Teacher	Room	Readings	
1	Mon	5/11	9-10	I: Introduction		BS	Vasa C	P1
			10-12	I: Technical change: concepts and basic models		BS	Vasa C	G1-2
	Wed	7/11	10-12	H: The foundations of history		BS	Vasa C	P2-3 (P16; G5.5-5.8, 6.5-6.7; C12; F8)
			13-15	H: The agricultural revolution		BS	KC	P3-6; G5.1-5.4 (P8-11; C17)
			15-17	H: Industrial revolutions I		BS	KC	P12-15; G4, G6.1-6.5; C18
Fri	9/11	13:00		<i>Hand in A</i>				
2	Mon	12/11	9-11	H: Industrial revolutions II	Hand out A groups	BS	Vasa C	P12-15; G4, G6.1-6.5; C18
	Wed	14/11	10-12	H: Industrial revolutions III	+ C parameters	BS	Vasa C	P12-15; G4, G6.1-6.5; C18
			13-15	T: From equilibrium to evolution		BS	KC	C:1-3 (G3)
			15-17	<i>Discussion A: Optimism, pessimism and determinism</i>		ANC, HAn, JA	Vasa 3,4,5	
	Fri	16/11	13:00		<i>Hand in B + Hand in E-group + subject</i>			
3	Mon	19/11	8-9	Quiz 1 (Readings for H+I)				
	Wed	21/11	9-12	T: From technologies to socio-technical systems	Hand out B groups	BS	Vasa C	C3-5, C18 (F1-2, F8)
			10-12	T: Technology interaction and transitions		BS	Vasa C	C5-6
			13-16	<i>Discussion B Contrafactual history</i>		ANC, HAn, JA	Vasa 3,4,6	
	Fri	23/11	13:00		<i>Hand in C</i>			
4	Mon	26/11	9-12	A: Technical change and future studies + <i>Discussion C (time 11-12)</i>		BS	Vasa C	C8 (F6-7)
	Wed	28/11	10-12	A: Technology policy		JA	Vasa C	C4, 7 (F2-3, F7)
			13-16	Discussion D: Movie - Who killed the electric car?		JA	KC	
5	Mon	3/12	8-9	Quiz 2 (Readings for T)				
	Wed	5/12	9-12	A: An entrepreneurial perspective on innovation		ME	Vasa C	
			10-12	A: Technical change and environmental assessment		BS	Vasa C	C9-11 (F4-5)
			13-15	A: Radical change and reflexive systems of innovation		BS	KC	C12-15
			15-17	A: Sustainability, expansion or collapse		BS	KC	C16-17, P7
Fri	7/12	13:00		<i>Hand in E</i>				
6	Mon	10/12	9-12	A: Technical Change in developing countries		HAh	Vasa C	
	Wed	12/12	10-12	Discussion E (compulsory presentation for E)		ANC, HAn, JA	ML11,12,13	
			13-16	-"		ANC, HAn, JA	FL62, 63, 64	
			16-17	S: Course summary	Hand out Exam	BS	Vasa C	P7,17; G8 (C16-17)
7	Mon	17/12	8-10	Quiz 3 (Readings for A+S)				
	Thu	20/12	15:00		<i>Hand in Exam</i>			
	Tue	15/1	13-17	Voluntary exam feedback/check		BS	ESA	

Teachers: Björn Sandén (BS), Hampus Andre (HAn), Johnn Andersson (JA), Anna Nyström Claesson (ANC), Martin Edlund (ME), Helene Ahlberg (HAh)

Lecture modules: Introduction (I), History (H), Theoretical perspectives (T), Applications and implications (A); Summery (S) *Italics = Compulsory discussions and hand-ins!*

Readings: Ponting (P), Grübler (G), Articles from "Collection of articles" (C), Further reading, not compulsory (F); in brackets () = additional reading for the lecture in question (not required for Quizzes).